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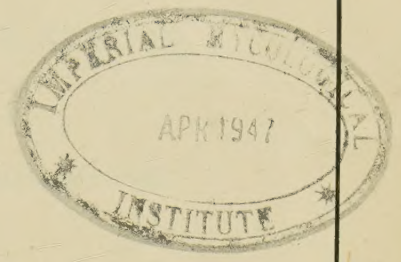

TANGANYIKA TERRITORY

DEPARTMENT OF AGRICULTURE

Twelfth Annual Report of the Coffee Research and Experiment Station Lyamungu, Moshi 1945

1946
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COFFEE RESEARCH AND EXPERIMENTAL STATION, LYAMUNGU, MOSHI

Report for the period 1st January to 31st December 1945

ADMINISTRATION—STAFF LIST—AS AT 31ST DECEMBER 1945

Chief Scientific Officer: S. M. Gilbert, B.Sc. (Agric.), N.D.A., Dip. Agric. (Wye).

Agricultural Officer: J. K. Robertson, B.Sc. (Agric.), (Aberd.), A.I.C.T.A.

Agricultural Assistant: A. W. Boot.

STAFF CHANGES

Mr. Robertson was absent from duty as follows—25th February 1945 to 21st March 1945 due to illness, and on vacation leave from 10th April 1945 to 1st October 1945. Mr. Ward carried out his duties from 25th June 1945 to 8th October 1945. Mr. Boot was appointed temporary Agricultural Assistant on 1st August 1945 and assumed duty on the 8th August 1945.

CONTACTS WITH GROWERS

There was a slight increase in the number of visits by planters both from Tanganyika and Kenya. Several officers working on coffee came to the station from the Belgian Congo, Kenya and Uganda. Many Africans came, including parties from the Kilimanjaro Native Co-operative Union, chiefs, instructors, schools and Bugishu coffee growers.

FINANCE

Details of expenditure for the year are given in Appendix I. Revenue amounted to £1,776 2*s*. 3*d*. of which £872 6*s*. 10*d*. was from coffee.

STATION DEVELOPMENT

Only one six-by-six Latin square—a comparative trial of Clonal coffee selections—was planted out.

The following table shows how the land is at present occupied:—

		Acres	Change
Coffee:			
(a) under 4 years	14·03		
(b) 4 to 6 years	20·28	83·83	+0·73
(c) over 6 years	49·52		
Nurseries and propagation beds		2·50	+0·50
Bananas and fodder grasses		48·00	+2·50
Paddocks		30·00	
Coppices and wind belts		33·00	
In preparation for experiments		14·27	+2·87
Forest		23·40	—6·60
Roads, buildings, etc.		28·00	+1·00
Bush—Cleared and uncleared		40·50	
Food crops for labourers		6·50	—1·00
	Total	310·00	

METEOROLOGY

The year's rainfall, which was below average, amounted to 57·63 inches. The monthly distribution is given below. That for the last half of 1944 is included as being an ideal distribution and this is reflected in the results from experimental treatments given under Work of Station for 1945.

Monthly Rainfall from July 1944 to December 1944

	Inches
July	2·21
August	1·43
September	2·42
October	3·15
November	3·10
December	5·14
Total ...	17·45

Yearly Rainfall from January 1945 to December 1945

	Inches		
January	1·72		
February	1·39		
March	4·85		
April	15·19		
May	21·34		
June	3·45	=	47·94
July	3·15		
August	1·33		
September	0·20		
October	0·05		
November	4·66		
December	0·30	=	9·69
Total ...			57·63 inches.

VEGETATIVE PROPAGATION

The number of cuttings rooted was nearly 9,000, but the number surviving the "hardening off" period was poor. No real improvement in this work will be made until a full-time horticulturist is again available.

PESTS AND DISEASES

Antestia was not such a pest as in the previous year due no doubt to the fact that high grade pyrethrum powder became available.

Hemileia was very bad and a further ½ per cent Bordeaux spraying had to be done after the long rains (July).

Leaf miner was again negligible.

PUBLICATIONS

Pamphlets by the Chief Scientific Officer on *The Multiple Stem System of Growing Coffea Arabica* (No. 39) and *The Mulching of Coffea Arabica* (No. 43) were published. An article entitled *A Brief Survey of the First Ten Years Work* by the Chief Scientific Officer was also published in the Empire Journal of Experimental Agriculture.

MISCELLANEOUS

During the year, at the request of the Moshi Native Coffee Board, fifty pupils were trained (twenty-five for three months and twenty-five for one month) as Instructors and eight as vegetative propagators.

ANIMAL HUSBANDRY

The average milk yield for the year for No. 1 herd was 2,046lb. All cows were dried off by the 300th day of lactation, if still in milk, to allow a full two months' rest before calving. The best cow reached 4,000lb. in her fourth lactation. Thirteen calves were born, of which eight were hiefers. Two died.

No. 2 herd, the progeny of the Baraton bull out of No. 1 herd, served by a Sahiwal-Boran cross bull, commenced to calve for the first time in December, 1945. Six calves were born, of which three were heifers. One died. The initial milk yields were very encouraging as, at the end of the year, one heifer was giving more than 20lb. and three others more than 15lb. per day.

The number of stock at the end of the year was as follows:—

	Numbers
Stud bulls	2
Home bred bulls for sale ...	9
Cows and in calf heifers	28
Heifer calves	16
Bull calves	7
Total ...	62

The revenue from sale of animals and produce was as under:—

	Shs.	Cts.
Stock	2,059	36
Milk cream, etc.	3,145	16

This work is suffering considerably from lack of suitable buildings. An application for the provision of new buildings has been under consideration for some time.

With the aid of manure from this stock, compost totalling upwards of 400 tons is made. This amount suffices to enable a dressing of 20 tons per acre to be applied every fifth year to each quarter of the coffee area in turn. This should maintain the soil in good heart and enable the full benefit of dressings of nitrogen fertilizers to be realized.

PADDOCKS AND FODDER GRASSES

The areas under these crops were maintained. A hairless variety of Elephant Grass obtained from Uganda is being propagated and extended.

STATION EXPERIMENTS

Lack of staff and shortage of efficient labour combined to make this year the most difficult since the Station began. These conditions coincided with a record crop of about 30 tons of parchment coffee. This crop was obtained from seventy acres aged four years upwards and works out at an average yield of 8·57 cwt. per acre. Since over twenty acres of this coffee are under six years of age a highly satisfactory yield was achieved and, at present prices, a highly remunerative one.

The process of conversion to Multiple Stem has continued on the appropriate areas by the removal of the remaining parts of the old single stem trees. In these areas the first cycle of multiple stem will carry the whole crop in 1946. In addition to various guard rows the area concerned is Experiment IX. This work continues on other experiments.

In the last half of 1944 and in January/March 1945 there was an adequate and well distributed rainfall. In consequence there was another big flowering in March which, because the trees were in good condition, they were able to mature. This accounts for the heavy yield in 1945.

Experiment I.—*Method of Planting—Planted 1935*

Although this experiment has begun biennial bearing, the yields in the "off" year are well above average. Thus in 1943 the mean yield was 14·53 cwt. and in 1944, 6·83 cwt. clean coffee per acre. Under the good conditions preceding this year's crop the phenomenal yield of 26·41 cwt. clean coffee per acre was obtained. There is every indication of a good average crop in 1946.

The yields for 1945 and a summary for the total period are given below:—

(a) Main Plots

Summary of Results for 1945

	Clean cwt. per acre	Percentages
No holing	24·86	94·1
*H3F1	27·73	105·0
†HF1	27·55	104·3
Hole sub-soiled:		
Without compost H3F1	26·14	98·9
„ HF1	25·19	95·3
With compost H3F1	27·07	102·5
„ HF1	26·39	99·9
Mean	26·41	100·0
Standard error	0·38	1·4
‡Significant difference, P = ·05	—	—

(b) Sub-Plots

Summary of Results for 1945

Planting:	Clean cwt. per acre	Percentages
Deep with ball of earth	25·83	97·8
Deep with bare roots	24·85	94·1
At nursery level:		
With ball of earth	26·81	101·6
Bare roots	28·14	106·5
Mean	26·41	100·0
Standard error	2·33	8·8
‡Significant difference, P = ·05	—	—

(a) Main Plots

Summary of Results for 8 years—1938 to 1945

	Clean cwt. per acre	Percentages
No holing	9·49	102·0
*H3F1	10·17	109·4
†HF1	8·70	93·6
Hole sub-soiled:		
Without compost H3F1	9·53	102·5
„ HF1	8·80	94·6
With compost, H3F1	9·59	103·2
„ HF1	8·81	94·7
Mean	9·30	100·0
Standard error	0·18	1·9
‡Significant difference = P = ·05	—	—

*H3F1 = Holed three months and filled one month before planting.
†HF1 = Holed and refilled one month before planting.
‡The results do not pass the test for significance.

(b) Sub-Plots

Summary of Results for 8 years—1938 to 1945

Planting:	Clean cwt. per acre	Percentages
Deep with ball of earth	8·82	94·8
Deep with bare roots	8·58	92·4
At nursery level:		
With ball of earth	9·86	106·0
Bare roots	9·93	106·8
Mean	9·30	100·0
Standard error	0·16	1·7
Significant difference, P = ·05	0·45	4·8

As in other experiments involving compost a substantial increase in crop was obtained for the first time this year. Adequate holing before planting still maintains first place as the best practice.

In the eight years' average the same general results obtain, the highest yields, 11 cwt. (approximately), being in the plots in which holing was done well in advance of planting and in which the trees were planted at nursery level. There is a slight advantage in planting with a ball of earth.

Experiment II.—*Seedling Selection Trials—Planted 1938*

This was a definite "off" year on the whole area. The only comment of note is the persistent good performance of the F's, selections from Kents coffee. The details of the year's crop follow:—

Latin Square I—Planted May 1938

	Mean of 5 years, 1941–1945	
	Clean cwt. per acre	Percentages
F502	4·62	130·9
P280	4·60	130·3
P313	4·51	128·3
P348	3·13	88·6
P147	2·70	76·2
P190	1·63	46·2
Mean	3·53	100·0
Standard error	0·17	4·81
Significant difference, P = ·05	0·51	14·5

Latin Square II—Planted October 1938

	Mean of 4 years, 1942–1945	
H133	3·01	106·7
L1	3·12	110·6
F839	3·69	130·9
N39	2·71	96·1
P147	2·17	77·0
E59	2·13	75·5
Mean	2·82	100·0
Standard error	1·09	38·7
Significant difference	—	—

Latin Square III—Planted October 1938

	Mean of 4 years, 1942–1945	
	Clean cwt. per acre	Percentages
H1	4·26	125·7
F840	4·24	125·1
P313	3·50	103·2
N69	3·21	94·7
N50	2·99	88·2
E665	2·15	63·4
Mean	3·39	100·0
Standard error	0·26	7·7
Significant difference P = ·05	0·72	21·5

The yields for the period of years are disappointing. This land was formerly in Ceara rubber and is not very good.

EXPERIMENT III.—*Seedlings versus Clones—Planted 1937*

This area serves as a training ground for grafting.

EXPERIMENT IIIa.—*Seedlings versus Clones—Planted 1942*

This experiment gave its first crop. The results are :—

Summary of Results for 1945

	Clean cwt. per acre	Percentages
Clones of sixteen mothers	3·17 ...	121·0
Seedlings of the same sixteen mothers ...	2·06 ...	78·6
Mean	2·62 ...	100·0
Standard error	0·23 ...	8·8
Significant difference, P = ·05	0·75 ...	28·6

The clones have started off with a clear superiority.

EXPERIMENT IV.—*Seedling Stock Experiment—Planted 1936*

This experiment remains in abeyance and is at present treated and harvested on a commercial basis.

EXPERIMENT V.—*3 × 3 × 3 Factorial Experiment—Mulch, Compost and Nitrogen—Planted 1940*

Owing to an acute shortage of labour the crop could not be reduced when imperative to do so; in consequence the trees have over-borne and show the strain.

The results of the year are given below. In general, nitrogen has had a depressing effect, mulch has given no significant results and, for the first time on the Station in twelve years, compost plots have yielded definitely better results. This latter effect is common to all experiments in which compost has been used. In the two-way table are shown the interactions, the only ones that are significant, between mulches and compost. It is seen that in the absence of compost mulch has been effective, but has had a depressing effect with the full quantity of compost. These contrary results appear to be related to the well spread rainfall of 1944–1945 (see meterological table) but the detailed causes are not clear and are under examination.

Summary of Results for "Mulch, Compost and Nitrogen effects" for 1945

	C0		C1		C2		Mean	
	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage
M0	13·49	90·1	15·91	106·6	16·31	108·9	—	—
M1	14·69	98·1	15·71	104·9	15·46	103·2	14·98	100·0
M2	14·26	95·2	15·63	104·3	13·38	89·4	—	—
Standard error	—	—	—	—	—	—	0·98	6·5
Significant difference, P = ·05	—	—	—	—	—	—	2·75	18·4

Over the period of four years no treatments have, in the aggregate, shown results, the benefit of mulch being masked by the high average yields in 1945.

Summary of Results—Mean of 4 years—1942–1945

	C0		C1		C2		Mean	
	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage
M0	5·43	108·4	4·98	99·4	5·11	102·0	—	—
M1	4·75	94·8	4·83	96·4	5·02	100·2	5·01	100·0
M2	5·40	107·8	4·94	98·6	4·61	92·0	—	—
Standard error	—	—	—	—	—	—	0·21	4·2
Significant difference, P = ·05	—	—	—	—	—	—	0·60	6·0

M0 = No mulch.
M1 = 40 lb. mulch per tree.
M2 = 80 lb. mulch per tree.

C0 = No compost.
C1 = 1 *debe* compost per tree.
C2 = 2 *debes* compost per tree.

EXPERIMENT VI.—*3 × 3 × 3 Factorial Experiment—Manurial Experiment (comparing kind, quantity and dates of application of Nitrogen)*

These plots have again been recorded for the purpose of a "Uniformity Trial". The artificials have not yet arrived.

EXPERIMENT VIIa.—*Conversion to Multiple Stem—Converted 1940*

The high yields have been maintained in the year of conversion. In 1946 the crop will be borne entirely on the new suckers. With the exception of the last treatment no differences of note have been obtained this year.

Summary of results for 1945

	Clean cwt. per acre	Percentage
Clean stumped, 3 suckers	12·05 ...	98·0
West side primaries cut off, 3 suckers from bottom	12·90 ...	104·9
East side primaries cut off, 3 suckers from bottom	12·56 ...	102·1
All except top three pairs of primaries cut off, 3 suckers from bottom	13·92 ...	113·2
Agobiada, multiple stem, 3 suckers ...	12·90 ...	104·9
Top cut at 3 feet from ground and 3 suckers left to grow at top	9·50 ...	77·2
Mean	12·30 ...	100·0
Standard error	0·71 ...	5·8
Significant difference, P = ·05	1·97 ...	16·0

Over the period of six years during which this experiment has been recorded the same three methods of conversion stand unchallenged, viz. (1) and (2) cutting off half the tree, either east or west and (3) leaving only three pairs of primaries at the top.

Summary of Results—Mean of 6 years 1940–1945

	Clean cwt. per acre	Percentage
Clean stumped, 3 suckers...	7·47 ...	88·8
West side primaries cut off, 3 suckers from bottom	9·16 ...	108·7
East side primaries cut off, 3 suckers from bottom	9·00 ...	106·8
All except top three pairs of primaries cut off, 3 suckers from bottom	9·33 ...	110·7
Agobiada, multiple stem, 3 suckers ...	7·98 ...	94·7
Top cut at 3 feet from ground and 3 suckers to left grow at top	7·64 ...	90·6
Mean	8·43 ...	100·0
Standard error	0·29 ...	3·4
Significant difference, P = ·05	0·80 ...	9·5

EXPERIMENT IX.—*Methods of Cultivation—Planted 1934*

This experiment apart from the results from treatments demonstrates three "donts" in coffee planting and whilst it is the poorest coffee on the station, it is kept for those reasons. They are (1) do not use a strain of coffee unsuitable to the district; (2) do not bring up sub-soil when terracing; (3) do not leave coffee unshaded on western aspects.

The coffee yielded fairly in 1945, but shows the strain. It has now been converted to Multiple Stem. Cultivation of the soil by *jembes* has, for the first time, given increased yields but the results do not pass the test for significance.

Summary of Results for 1945

Treatment:	Clean cwt. per acre	Percentage
Forked hoe (forked *jembe*)	6·28	107·5
West Indian hoe (*jembe*)	6·60	113·0
No cultivation	5·79	99·1
Envelope forked	5·29	90·6
Trenching	5·24	89·7
Mean	5·84	100·0
Standard error	0·62	10·70

The results over a period of eight years are given below. They are not significantly different.

Summary of Results—Mean of 8 years 1938–1945

Treatment:	Clean cwt. per acre	Percentage
Forked hoe (forked *jembe*)	5·12	108·3
West Indian hoe (*jembe*)	5·24	110·8
No cultivation	4·81	101·7
Envelope forked	4·13	87·3
Trenching	4·34	91·8
Mean	4·73	100·0
Standard error	0·40	8·5

EXPERIMENT X.—*Artificial Shade—Planted 1937*

This experiment remains in abeyance as no webbing has been procurable. The results are given for record purposes:—

Summary of Results for 1945

	Clean cwt. per acre	Percentage
Canopies of webbing 1″ width and 1″ spacing, 16′ from the ground	11·69	103·9
Canopies of webbing 1″ width and 2″ spacing, 16′ from the ground	10·84	96·4
Nil	11·33	100·7
Ground shade of Terrolas and sand plaster	11·13	98·9
Mean	11·25	100·0
Standard error	0·86	7·6

Summary of Results—Mean of 5 years 1941–1945

	Clean cwt. per acre	Percentage
Canopies of webbing 1″ width and 1″ spacing, 16′ from the ground	3·90	100·5
Canopies of webbing 1″ width and 2″ spacing, 16′ feet from the ground	3·92	101·0
Nil	3·79	97·7
Ground shade of Terrolas and sand plaster	3·94	101·5
Mean	3·88	100·0
Standard error	0·24	6·2

EXPERIMENT XI.—*Kents* versus *Bourbon—Planted 1935*

Kents coffee now outstrips Bourbon in yield.

Summary of Results—Mean of 8 years 1938–1945

	Clean cwt. per acre	
	Kents	Bourbon
1938	7·69	7·12
1939	4·86	3·11
1940	3·70	5·10
1941	12·87	9·51
1942	5·72	9·34
1943	11·84	8·01
1944	12·90	9·20
1945	5·65	2·97
Mean	8·15	6·80

EXPERIMENT XII.—*Selection in Nursery—Planted 1935*

No significant results have been obtained over the period.

Summary of Results for 1945

	Clean cwt. per acre	Percentage
Tops cut back	4·99 ...	88·6
Good tops and good roots	5·74 ...	102·0
Average	6·30 ...	111·9
Good tops and poor roots	4·65 ...	82·6
Poor tops and good roots	5·56 ...	98·8
Poor tops and poor roots	6·49 ...	115·3
Mean	5·63 ...	100·0
Standard error	1·02 ...	18·1

Summary of Results—Mean of 8 years 1938–1945

	Clean cwt. per acre	Percentage
Tops cut back	4·70 ...	95·14
Good tops and good roots	5·20 ...	105·26
Average	5·02 ...	101·62
Good tops and poor roots	4·71 ...	95·34
Poor tops and good roots	4·75 ...	96·15
Poor tops and poor roots	5·23 ...	105·87
Mean	4·94 ...	100·00
Standard error	0·39 ...	7·89

EXPERIMENT XIII a, b, and c.—*Multiple Stem* versus *Single Stem*

As was to be expected in the year of going over to a new cycle the single stem plots have yielded more heavily than those of the multiple stem in 1945. The "agobiada" plots were not advanced enough for the change over.

Summary of Results for 1945

	Clean cwt. per acre	Percentage
Single stem	~~8·42~~ 10.99 ...	~~94·5~~ 123.3
Multiple stem, 3 suckers	7·33 ...	82·3
Agobiada, multiple stem, 3 suckers ...	~~10·99~~ 8.42 ...	~~123·3~~ 94.5
Mean	8·91 ...	100·0
Standard error	1·06 ...	12·3
Significant difference, P = ·05	3·65 ...	41·0

Summary of Results—Mean of 8 years 1938–1945

	Clean cwt. per acre	Percentage
Single stem	~~6·51~~ 5.43 ...	~~92·6~~ 77.2
Multiple stem, 3 suckers	9·13 ...	129·9
Agobiada, multiple stem, 3 suckers ...	~~5·43~~ 6.57 ...	~~77·2~~ 92.6
Mean	7·03 ...	100·0
Standard error	0·31 ...	4·4
Significant difference, P = ·05	1·06 ...	15·1

Over the whole period of eight years, however, the recommended system of Multiple Stem has maintained its great superiority, yielding an average yearly of over nine hundredweights compared to five and half hundredweights of the single stem system.

EXPERIMENT XIV.—*Mulch Experiment—Planted 1935*

The yields are low as the coffee is in process of being converted to Multiple Stem. As in Experiment V compost has given significant results superior to all treatments except Banana and Guinea grass mulches and clean weeded. This is the first response to compost in the history of the station.

Summary of Results for 1945

Treatment (per tree)	Clean cwt. per acre	Percentage
Banana mulch (80 lb.)	1·88	103·3
Guinea grass mulch (80 lb.)	2·05	112·6
Banana mulch (40 lb.) plus sulphate of ammonia (½ lb.)	1·06	58·2
Elephant grass mulch (80 lb.)	1·46	80·2
Clean weeded	1·82	100·0
Weeds as mulch	1·95	107·1
Elephant grass mulch (40 lb.) plus sulphate of ammonia (½ lb.)	1·71	94·0
Clean weeded plus compost (two *debes*)	2·60	142·9
Mean	1·82	100·0
Standard error	0·27	14·84
Significant difference, P = ·05	0·78	42·86

Over the total period of eight years the Banana and Guinea grass mulches maintain their superiority.

Summary of Results—Mean of 8 years 1938–1945

Treatment (per tree)	Clean cwt. per acre	Percentage
Banana mulch (80 lb.)	6·28	122·7
Guinea grass mulch (80 lb.)	6·05	118·2
Banana mulch (40 lb.) plus sulphate of ammonia (½ lb.)	4·92	96·1
Elephant grass mulch (80 lb.)	4·33	84·6
Clean weeded	4·98	97·3
Weeds as mulch	4·21	82·2
Elephant grass mulch (40 lb.) plus sulphate of ammonia (½ lb.)	4·99	97·5
Clean weeded plus compost (2 *debes*)	5·19	101·4
Mean	5·12	100·0
Standard error	0·24	4·7
Significant difference, P = ·05	0·69	13·5

EXPERIMENT XIVa.—*Mulch Experiment—Planted 1940*

In this experiment the 1945 crop was heavy. In the main plots compost has once again given the heaviest yields. This is mainly due to its effectiveness in the presence if nitrogen. In the nitrogen sub-plots Banana mulch and Guinea grass mulches have held their own. It is not understood why the presence of nitrogen has hitherto had an adverse effect. Soil analyses are now being done. Over the whole period, however, this adverse effect appears to be decreasing (*see* second table) and only on the one instance in 1945—Elephant grass mulches—are the plots with nitrogen any longer inferior. For the eight years the Banana and Guinea grass plots have averaged a superior yield.

Summary of Results for 1945

Treatment:	Main Plots		Without Nitrogen*		With Nitrogen* 4 oz. per tree	
	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage	Clean cwt. per acre	Percentage
Nil	10·74	93·2	10·13	90·9	11·35	95·5
Banana mulch (80 lb. per tree)	11·47	99·5	10·95	98·2	12·00	100·9
Elephant grass (80 lb. per tree)	11·70	101·8	12·19	109·3	11·22	94·4
Guinea grass (80 lb. per tree)	11·44	99·2	10·95	98·2	11·93	100·3
Compost (50 lb. per tree)	12·26	106·3	11·57	103·8	12·95	108·9
Mean	11·52	100·0	11·15	100·0	11·89	100·0
Standard error	–	–	0·37	3·3	0·37	3·1
Significant difference, P = ·05	–	–	1·09	9·8	1·09	9·2

Summary of Results—Mean of 4 years 1942–1945

Nil	4·39 ...	91·8 ...	4·26 ...	87·1 ...	4·51 ...	96·6
Banana mulch (80 lb. per tree)	4·91 ...	102·7 ...	5·01 ...	102·5 ...	4·82 ...	103·2
Elephant grass (80 lb. per tree)	4·76 ...	99·6 ...	4·96 ...	101·4 ...	4·57 ...	97·9
Guinea grass (80 lb. per tree	5·15 ...	107·7 ...	5·50 ...	112·5 ...	4·80 ...	102·8
Compost (50 lb. per tree) ...	4·66 ...	97·5 ...	4·68 ...	95·7 ...	4·63 ...	99·1
Mean	4·78 ...	100·0 ...	4·89 ...	100·0 ...	4·67 ...	100·0
Standard error	~~1·69~~ 0·15	~~0·15~~ 3·1	0·15 ...	3·1 ...	0·15 ...	3·2
†Significant difference ...	– ...	– ...	– ...	– ...	– ...	–

*Sulphate of ammonia.
†The results do not pass the test for significance.

EXPERIMENT XV.—*Irrigation and Mulching—Planted 1940*

This experiment is a complex factorial lay-out with clones, which has been analysed thoroughly by the Statistical Department, Rothamsted Experimental Station, to whom grateful acknowledgment is made. The computers comment as follows:—

"The coffee yields have shown large responses to each of the irrigation and mulching treatments. Irrigation treatments two and three differ only in the intervals at which the effective rainfall is made up to the standard amount, and probably the total water supply in the season is not very different for the two treatments; the amount will be about twice that for treatment 1. There is some indication that the response to the double level is a little higher than to the single, but the difference is too small to be judged significantly on the data so far available. The results show clearly that responses to irrigation and mulching are interdependent. The response to irrigation in the absence of mulch is greater than when mulch is given, and the additional response to the double level of irrigation is then more marked. In the absence of irrigation the response to mulch is greater than on the irrigation plots, and there is also a suggestion that the yields respond more to the double quantity of mulch than to the single when there is no irrigation. The smaller differential effects are not statistically significant."

The results are given below:—

Adjusted Mean Yields for Interactions of Irrigation of Mulching
Summary of Results—Mean of 3 years 1942–1944

Mulch	IRRIGATION 0	1	2	3	Mean
	Clean cwt. per acre	Clean cwt. per acre	Clean cwt. per acre	Clean cwt. per acre	Clean cwt. per acre
0 ...	0·80 ...	3·40 ...	4·17 ...	3·81 ...	3·03
1 ...	3·58 ...	5·21 ...	5·86 ...	5·26 ...	4·98
2 ...	3·92 ...	5·28 ...	5·41 ...	5·74 ...	5·05
3 ...	4·05 ...	5·16 ...	5·16 ...	4·57 ...	4·76
Mean ...	3·07 ...	4·76 ...	5·18 ...	4·84 ...	4·46
Standard error	— ...	— ...	— ...	— ...	±0·40

In the field, however, the stage has been reached when irrigated plots *without* mulch clearly show adverse affects.

This experiment is also noteworthy in that it affords, for the first time, clear indication of differences in yields of clones where environment is the same, that is, genetic differences. Between the best and worst there is twenty per cent increase in yield, one definitely of economic importance.

Mean Yields of Clones
Summary of Results—Mean of 3 years 1942–1944

Clean cwt. per acre

No. in the field	1	2	3	4		Standard error
Clones types	Kil 50 ...	Kil 98 ...	Kil 48 ...	Kil 10 ...	Mean ...	—
Clean cwt. per acre	3·99 ...	4·59 ...	4·33 ...	4·95 ...	4·46 ...	0·20
Percentages	89·5 ...	102·9 ...	97·1 ...	~~111·17~~ 111·7 ...	100·0 ...	±4·5

EXPERIMENT XVIII.—*Clonal Selection Trials—Planted 1943*

The results for the year are given for purposes of record. No conclusions can naturally be drawn from the crops in the first year of bearing except to say that some clones are definitely promising as they were only planted in 1943.

Summary of Results for 1945 Crop

Latin Square I—Planted April 1943

Clone	N39	R23	N71	I60	M2	L1	Mean	Significant Difference (P=·05)
Clean cwt. per acre	4·84	1·29	1·37	2·04	1·90	2·33	2.29	0·76
Percentage	211·4	56·3	59·8	89·1	83·0	101·7	100·0	33.2

Latin Square II—Planted April 1943

Clone	N48	N197	N5	N29	N30	N20	Mean	Significant Difference (P=·05)
Clean cwt. per acre	2·06	4·17	5·29	3·03	2·98	1·44	3·17	1·39
Percentage	65·0	131·6	166·9	95·6	94·0	45·4	100·0	43·8

Latin Square VII—Planted June 1943

Clone	R15	N81	KP228	I49	S16	N34	Mean	Significant Difference (P—·05)
Clean cwt. per acre	3·63	3·76	2·80	2·14	2·32	1·68	2·73	1·30
Percentage	133·0	138·0	102·6	78·4	85·0	61·5	100·0	47·6

Latin Square VIII—Planted August 1943

Clone	R2	H66	M7	AB92	N218	H100	Mean	Significant Difference (P=·05)
Clean cwt. per acre	2·38	2·57	1·46	0·95	2·23	2·22	1·97	1·02
Percentage	120·8	130·5	74·1	48·2	113·2	112·7	100·0	51·8

EXPERIMENT IV.—*Latin Square V—Planted April 1942*

Clone	N39	R3	L1	N100	N197	Mean	Siginficant Difference (P=·05)
Clean cwt. per acre	2·47	4·37	3·86	2·97	4·23	3·58	1·02
Percentage	69·0	122·1	107·8	83·0	118·1	100·0	28·5

EXPERIMENT IV.—*Latin Square II—Planted April 1943*

Clone	N39	L1	N100	N197	R3	Mean	Significant Difference (P=·05)
Clean cwt. per acre	1·11	1·40	1·19	1·64	1·31	1·33	0·45
Percentage	83·4	105·3	89·5	123·3	98·5	100·0	33·8

Seven additional Latin squares were planted in 1944 and 1945, but these are not yet in bearing.

Three further squares have been prepared and material rooted and will be planted in 1946 rains.

The two squares in Experiment IV contain the five most promising trees and it is aimed to plant one each of these trees in each of the other squares in Experiment XVIII as a link between the behaviour of the various selections.

It is seen that, age for age, yields are not as good in Experiment IV. The soil is poorer than that of Experiment XVIII and the routine treatment has not been of as high a standard. In general, results are erratic as is to be expected in the first year of bearing. A minimum of four years' yields are required before any conclusive results can be drawn.

Lyamungu,
April 1946

S. M. GILBERT,
Chief Scientific Officer

STATEMENT OF EXPENDITURE FOR THE PERIOD 1ST JANUARY TO 31ST DECEMBER, 1945

I.—Personal Emoluments

Item No.		Provision Shs.	Cts.	Expenditure Shs.	Cts.
3.	Chief Scientific Officer	24,000	00	24,000	00
25.	Clerks (L.C.S.)	5,380	00	5,380	00
26.	Recorders (L.C.S.)	7,080	00	5,916	19
28.	Mechanics (L.C.S.)	5,220	00	5,133	00
29.	Instructors (Ungraded)	964	00	962	50
32.	Laboratory Assistants	2,220	00	537	33
33.	Overseers	940	00	936	00
35.	Motor Drivers	660	00	660	00
36.	Messengers	490	00	414	00
		46,954	00	43,939	02

II.—Other Charges

38.	Travelling Allowances	1,000	00	377	25
39.	Transport	5,000	00	3,788	34
40.	Maintenance and Running of Motor Vehicles	3,900	00	3,855	10
41.	Bicycles	200	00	187	00
42.	Books of Reference	500	00	326	83
43.	Contingencies	300	00	278	22
45.	Stationery	500	00	232	56
60.	Upkeep of Agricultural Stations	2,000	00	1,383	65
62.	Upkeep of Coffee Research Station:				
	(a) Labour			36,933	79
	(b) Field Experiments off Station			—	
	(c) Maintenance of Power, Gas, etc.			2,196	17
	(d) Maintenance of Water Supply			345	00
	(e) Upkeep of Coffee Factory	59,800	00	1,993	92
	(f) Upkeep of Stock			2,943	82
	(g) Equipment and Materials			3,853	53
	(h) Trials of Clonal Coffee			2,499	25
	(i) Miscellaneous			522	50
	(j) Cowshed			7,199	87
		73,200	00	68,916	80
	Outstanding accounts on Crown Agents' Indents and Railways	—		1,280	00
		73,200	00	70,196	80
53.	Increased Food Production:				
	(b) Production of Vegetable Seed: Labour	4,000	00	499	84

Head 36, Subsidization, etc.

2.	Cost of Living Relief			6,691	39

Head 26, Miscellaneous Services

25.	Transport and Allowance on Leave			162	60
27.	Postages			26	70
				189	30